DOCUMENT RESUME

ED 431 745 SP 038 611

AUTHOR Levin, Barbara B.; Truscott, Elizabeth H.
TITLE Analysis of the Content of E-Mail Exchanged among Preservice Elementary Teacher Candidates.
PUB DATE 1996-10-00
NOTE 26p.; Paper presented at the Annual Meeting of the American Association for Teaching and Curriculum (3rd, San Antonio, TX, October 17-19, 1996).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS College School Cooperation; Computer Uses in Education; Educational Technology; *Electronic Mail; Elementary Education; Elementary School Teachers; Higher Education; Partnerships in Education; Preservice Teacher Education; Professional Development Schools; *Student Teacher Attitudes; Student Teachers; Student Teaching

ABSTRACT

This paper presents an analysis of the content of electronic mail exchanged among a team of 24 undergraduate elementary education majors in a Professional Development School program during 1 year of their 2-year teacher education program. Teacher candidates were required to exchange journal entries via e-mail with peers and communicate with keypals who were also preservice teachers in another state. Qualitative analysis of the e-mail exchanged revealed that dialogue centered on several themes: (1) relationships with students, cooperating teachers, university supervisors, and fellow interns; (2) concerns about their own development as teachers; (3) personal issues; (4) professional issues including children's special needs, gender issues, parent and family communications, and questions about the purpose of schooling; (5) concerns about teaching, including instruction, planning, and curriculum; (6) issues related to specific grade levels, such as the difference in behavior and curriculum in different grades; and (7) technical issues regarding use of electronic mail. Overall, the e-mail messages exchanged appeared to provide these prospective teachers with a good outlet to think about and process their field experiences. The content of the exchanges were focused, highly reflective, and oriented to shared problem solving, moral support, and positive feedback. (Contains 38 references.) (Author/SM)

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Analysis of the content of e-mail exchanged among preservice elementary teacher candidates

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This paper was presented at the Third Annual Conference of the American Association for Teaching and Curriculum (AATC) in San Antonio, TX, October 17-19, 1996.

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ABSTRACT

This paper presents an analysis of the content of electronic mail exchanged among a team of 24 undergraduate elementary education majors in a Professional Development School (PDS) program during one year of their two-year teacher education program. Teacher candidates were required to exchange journal entries via e-mail with peers and communicate with keypals who were also preservice teachers in another state. Qualitative analysis of the e-mail exchanged revealed dialogue centered on several themes: (1) relationships with students, cooperating teachers, university supervisors, and fellow interns; (2) concerns about their own development as teachers; (3) personal issues; (4) professional issues including children's special needs, gender issues, parent and family communications, and questions about the purpose of schooling; (5) concerns about teaching including instruction, planning, and curriculum; (6) issues related to specific grade levels, such as the differences in behavior and curriculum in different grades; and (7) technical issues regarding use of electronic mail. Overall, the e-mail messages exchanged appeared to provide these prospective teachers with a good outlet to think about and process their field experiences. The content of the exchanges were focused, highly reflective, and oriented to shared problem-solving, moral support, and positive feedback.

Analysis of the content of e-mail exchanged among preservice elementary teacher candidates

Electronic mail is a viable and popular method of communication on college and university campuses (e.g. Anderson & Lee, 1995; Schlagal, Trathen & Blanton, 1996; Souviney, Saferstein & Chambers, 1995; Thomas, Clift & Sugimoto, 1996). Students use e-mail to contact their professors, to keep in touch with friends locally and on other campuses, and to access and send assignments. Many professors use electronic mail to conduct or foster class discussions, respond to student questions, and for their own personal and professional uses. On many college campuses every student is assigned an e-mail address when they register, whether they use it or not. Faculty in schools, colleges, and departments of education are very aware of the potential uses of electronic mail for communicating with their preservice and inservice teachers (Schlagal et al., 1996; Souviney et al., 1995; Thomas et al., 1996). Several universities are using e-mail as an integral part of their teacher education program (e.g. Thomas, et al., 1996) including cutting-edge applications of telecommunications such as student Home Pages on the World Wide Web.

This paper presents a detailed analysis a year-long study of electronic mail exchanged among 24 preservice teacher candidates from a team of undergraduate, preservice, elementary education majors at a university in the southeastern United States. The content and the purposes of three types of e-mail exchanges were studied: (1) peer-to-peer exchanges as part of required journal assignments, (2) peer-to-peer keypal exchanges with teacher candidates at a university in another state, and (3) student to professor/supervisor exchanges outside of required journal assignments. The results of content analyses of these three types electronic mail exchanges is reported and implications for the potential impact on the development of critical reflectivity in preservice teachers education is discussed.

Background for this Study

Professional Development Schools

In recent years the field of teacher education has moved away from apprenticeship models with single student teaching experiences toward Professional Development School (PDS) models (e.g. Darling-Hammond,

1994; Lieberman & Miller, 1992). In most PDS programs prospective teachers spend significant amounts of time in a variety of practicums or internships and other field experiences prior to student teaching. They take their foundations and methods courses at the university concurrently with their field experiences, and they progress through their program in cohort groups for mutual support. The cohort group concept also increases opportunities for preservice teachers to discuss what they are learning from their coursework and field experiences with peers who are at approximately the same stage of development as teachers.

In addition, some PDS programs, such as the one at the University of North Carolina at Greensboro (UNCG) are activity-oriented, inquiry-based programs that engage prospective teachers in a variety of reflective practices as part of their preparation to become elementary school teachers. For example, in our PDS program at UNCG teacher candidates undertake case studies of individual children, conduct regular peer observations using a peer coaching model, discuss and write their own dilemma-based cases, participate in group and individual action research projects, and develop teaching and technology portfolios over the course of two years in their teacher preparation program.

The philosophical and theoretical perspective of the teacher education program at UNCG is a constructivist one (Ammon & Levin, 1993; Fosnot, 1989, 1995; Henderson, 1996; Levin & Ammon, 1992; Zemelman, Daniels & Hyde, 1993). That is, we believe that prospective teachers construct their own understandings of teaching and learning based on their prior knowledge and beliefs, their current and past experiences related to learning to teach, and on focused reflection on these experiences. In addition, we also believe that providing a variety of inquiry-based and reflection-oriented experiences for preservice teachers helps them gain a better understanding of teaching and learning, which will make them better teachers. Toward this end, we ask our teacher candidates to submit reflective dialogue journals about their field experiences every few weeks. Two of the entries in these journals are written directly to the university supervisor/instructor, one entry is submitted via electronic mail to a peer who responds to the journal entry via e-mail, and one more entry is sent via e-mail to a keypal who is another preservice teacher in a different state. This paper reports our analysis of the two different types of peer-to-peer e-mail correspondence and additional e-mail exchanged

with their university instructor/supervisor outside of the required journal assignments. We describe the topics discussed and the uses these exchanges appear to serve for our preservice teacher candidates based on a content analysis of all e-mail exchanges from two semesters.

Review of Relevant Literature

Using Journals as a Reflective Activity

Numerous studies in the teacher education literature attest to the potential value of using dialogue journals to promote reflection (Beach, 1994; Guillame & Rudney, 1993; Hoover, 1994; Kasten & Ferraro, 1995; Lerner, 1993; Surbeck, Han & Moyer, 1991; Zulich, Beane & Herrick, 1992), hence to promote the development of teachers (e.g. Ammon & Levin, 1993; LaBoskey, 1995). Different formats for reflective journals are described in the teacher education literature and attributions are made about the value of various kinds of journals for promoting reflection (Beach, 1994; Guillame & Rudney, 1993; Hoover, 1994; Lerner, 1993; Scherr, 1993; Zulich, Beane & Herrick, 1992). In general, the use of journals of various kinds in teacher education programs is thought to be useful in encouraging and promoting reflection during the learning to teach process (e.g., Ammon & Levin, 1993; LaBoskey, 1995; Valli, 1992). However, the level of reflection seen in journals varies with the individual's propensity for reflection (LaBoskey, 1995; Surbeck, Han & Moyer, 1991), time in the program (Zulich, Bean & Herrrick, 1992) and focus of the teacher education program (Zeichner & Liston, 1987; Ross, Johnson & Smith, 1992).

Teacher Development and Levels of Reflection

Early work by Frances Fuller (1969) and Fuller and Brown (1975) about the connection between reflection and teacher development predated many other studies during the past two decades (e.g. Henderson, 1996; Huberman, 1993; LaBoskey, 1995; Norton, 1994a, 1994b; Ross, et al, 1992; Zeichner & Liston, 1987) that also studied this connection. These researchers use various data sources and assign different kinds of reflective activities to assess, develop, and promote preservice teachers' levels of reflection in their work. Among the activities and data sources used for studying reflection are various kinds of journals, written reflections on videotapes of teaching events, analyses and/or creation of case studies, the study of metaphors, creating art or writing about images of teachers and learners, conducting action research projects, and composing one's educational philosophy. Certain kinds of

activities designed to encourage reflection and metacognitive thinking in preservice teachers appear to focus the reflections on personal concerns (Hoover, 1994), which Fuller and Brown (1975) called "survival" concerns, while other kinds of written reflections encourage preservice teachers to reflect on the teaching situation including curriculum and instructional strategies and eventually on one's teaching decisions based on the needs of the students. Other scholars, such as Zeichner and Liston (1987) write about the importance of not just encouraging reflection per se but about fostering reflection that goes beyond personal concerns and a focus on technical issues to encouraging reflection on educational principles and practices including critical issues in education and the moral, political, and social implications of curriculum and education.

In this study, the use of peer-to-peer electronic mail journals and exchanging mail with keypals, who are also teacher candidates in another state, provided additional opportunities for reflection. However, the level of reflection, the content of these communications, and whether e-mail encourages reflection on personal concerns, technical concerns, or critical issues and deliberations about educational principles and practices is not inherent in the medium used. Our analysis and description of the content, type, and tone of different types of e-mail journals sheds some light on the value of using journals and other communications via e-mail on how preservice teachers think and reflect, hence on their development as reflective practitioners.

Electronic Mail as a Reflective Activity

Early studies of the use of electronic mail among teachers, such as Merseth's (1991) survey of induction-year teachers who used electronic mail to keep in touch with their peer group, and more recent studies (Anderson & Lee, 1995; Souviney et al., 1995), indicate that the messages exchanged focused on social, emotional, and moral support (personal concerns) rather than on curriculum and teaching concerns (technical concerns) or other professional questions (including critical issues).

Other recent studies, such as the one conducted by Thomas et al. (1996), provide evidence that one's audience for an e-mail communication is likely to influence the content of the message. For example, Thomas et al. (1996) found that their students selected to read instructors' messages first over peer comments on the same topics related to course content, unless the message

from a peer was directed to them personally. In addition, Thomas and her colleagues reported that their students felt that telecommunication via e-mail was a depersonalizing or "cool, impersonal medium" (Thomas et al., 1996, p. 173), which users chose to ignore in favor of other forms of communication including telephone or face-to-face conversations in both smaller or larger group settings. They suggested that use of e-mail may increase if there is interdependence and an expectation for response in addition to easy access. Schlagal et al. (1996) also suggested that the structure and expectations of the e-mail requirements, whether they were structured or unstructured, focused or unfocused, and whether adequate time was allocated influenced the content and level of reflection in e-mail exchanges between faculty and students and among the students themselves.

On the other hand, teacher candidates in the Souviney et al. (1995) study found e-mail a particularly effective method for communicating with distinct advantages over voice mail, print messages, and even face-to face conversations. Souviney, and his colleagues found that secondary education interns tailored the use of e-mail to their personal needs based on their existing social network, problems encountered with using electronic mail, and personal time constraints.

Methods

Participants

Twenty-four prospective elementary grade preservice teachers participated in this study from January to December, 1995. This time period spanned the second and third semesters of their four semester teacher education program. Among the participants were four white males, three African-American females, one International student from the Caribbean, and 16 white females. Two of the participants were nontraditional, second-career students seeking a second undergraduate degree, while the remaining participants were traditional college-age students.

All participants were part of a cohort group who took all their methods and foundations courses together. They were also assigned to ten-hour weekly internships in PDS sites for three semesters prior to full-time student teaching during the fourth semester. Each participant interned at one of two different Professional Development Schools in a large, recently consolidated school district in the southeast. Most participants switched PDS sites each semester and later negotiated a student teaching placement with a

cooperating teacher they had interned with earlier. An additional feature of their PDS program was a two-hour weekly seminar held on campus that was tied to the internship experience. The e-mail journals and keypal exchanges examined in this study were among several requirements for this seminar. The first author served as seminar leader, university-based supervisor, academic advisor, and a methods course instructor during part of this study. The second author was a graduate research assistant working with the seminar leader, but did not work directly with the participants.

Data Collection

The data for this study were collected in several ways. For example, most participants either forwarded copies of their peer-to-peer journals and their keypal exchanges electronically to the first author, or printed copies of these e-mail exchanges and attached hard copies to the rest of their journal. Additional e-mail messages sent to the first author were printed for later analysis, as were all forwarded copies of the peer-to-peer and keypal exchanges. Additional data related to the usefulness of e-mail and keypal exchanges were gleaned from participants' technology portfolio entries and reflections about these topics (Levin, 1996). These portfolio reflections were used to shed light on participants' attitudes about e-mail journals and having keypals, but provided no further information about the content of these exchanges.

Data Analysis

We analyzed the data for this study qualitatively using the methods of constant comparative analysis (Glasser & Strauss, 1967) and pattern matching to identify recurrent themes suggested by Miles and Huberman (1984). We were interested in identifying (a) the content and topics discussed and (b) the use or purpose the messages served for the participants. In reading and re-reading the three types of e-mail exchanges 19 themes emerged during preliminary analysis based on a total of 196 peer-to-peer messages, 86 messages between participants and instructor/supervisor, and 29 keypal exchanges. The preliminary themes were combined into seven categories: Relationships, Teacher Development, Personal Issues, Professional Issues, Teaching, E-mail/Technical Problems, and Grade Level issues. These categories were based on logical groupings of related themes and sub themes found across all e-mail messages, and corroborated by our review of the recent literature on coding teacher concerns typically found in reflective journals

(e.g. Guillame & Rudney, 1993; Hoover, 1994; Koskela & Cramer, 1994; Surbeck et al., 1991) and in electronic mail exchanges (Souviney, et al., 1995; Thomas, et al., 1996). Interrater reliability based on separate reading and coding of 25 randomly selected e-mail messages by the two authors reached 85% for content. Discrepancies were resolved through discussion and the identification of exemplars describing each category.

Souviney, et al. (1995) also suggested that when coding e-mail researchers must pay attention to the complexity of the social network of the participants to be sure the codes reflected their uses of e-mail rather than the goals of the teacher preparation program. Data in this study were also coded for use of the message and eight categories emerged: Descriptive, Reflective, Feedback (unsolicited), Request for Feedback, Support, Evaluation, Problem-solving, and Questions. Interrater reliability for use of the messages reached 95%.

Final analysis of all 311 messages required multiple codings for the content and use of message depending on the length of the exchange and the variety of topics discussed in a given piece of e-mail. Often many topics were discussed and several uses were embedded in one e-mail exchanges. The total number of topic codes assigned was 1568 and the total number of use codes assigned was 813. Percentages of each content or topic category and for each use were tallied and are reported in Table 1 and Table 2.

Insert Table 1 about here

Findings

Content of Peer-to-Peer E-mail Exchanges

In the peer-to-peer e-mail exchanges, 38% of the topics coded were about their own development as teachers. Content of messages that we coded as teacher development included discussions by participants about their future plans in education, reflections about their process of learning to teach, their reflections on progress in developing teaching skills during their internship, fears about not being respected or competent, and attitudes and opinions about their field placement. For example, two participants reflected about these kinds of concerns with their peers:

.... however, [I] miss my other class but I think the lower grades is [sic] the place for me. I've already gotten to do a lot with the kids and I'm very excited about the rest of the semester...

... did a lot of observation last Wednesday to see how my semester might go. I have my work cut out for me, but all I need to do is stay confident and be positive...

The next most frequent topic discussed between peers had to do with teaching and accounted for 32% of all topics coded in their e-mail. Entries in the category we labeled teaching included general discussions about planning for teaching, discussions of their own lesson plans and their cooperating teachers' lessons, and reflections on the effectiveness of their planning and instruction, and comments about the curriculum including the content and appropriateness of the curriculum for their children. For example, one teacher candidate described her cooperating teacher and what she observed to a peer:

She really wants to make sure that each child gets the knowledge. She will stop class to help a child pronounce a word. She lets them know that they can do the work and does not give them the answer but rather makes them search their past knowledge to get it.

Another example related to teaching and children with special needs from the peer-to-peer e-mail was this:

I will have to keep him in mind when planning my lessons, just as Mr. M- is having to do now.

And, here is an example of unsolicited feedback in from one peer to another about a teaching incident:

I think it's also great that you had the presence of mind to adapt your storytelling and turn it into a successful lesson. It takes nerve and smarts to realize when you need to adjust the lesson.

The third most frequent category of discussion, which accounted for only 12 % of the content of their peer-to-peer exchanges, surrounded what we call professional issues: problems that children face, children with special needs, gender equity issues, questions about the purpose of schooling, concerns about communicating with parents, and school-community relations in general. An example is this participant's description of one of the PDS sites:

You really have to observe and understand the environment and homelife of these children. For the most part it is totally different than J-school being that this school is in the center of governmental housing and the population is predominantly minority.

Although there were no differences between the male and female participants in this study with regard to the top three topics discussed peer-to-peer, there was an interesting gender difference with regard to discussions about relationships. That is, 14% of the males' discussions but only 8% of the females' discussions were about relationships. E-mail exchanges that we coded as about relationships included talk about support from fellow interns, from their cooperating teachers and university supervisors, and relationships with the children in their internship placements. For example, one of the male participants wrote to a peer:

I must say that I was relieved once I had broken the ice and finally had the opportunity to talk to Mr. K- on a personal level.

And, one of the female participants wrote to another:

Mrs. W is a great OSTE [on-site teacher educator]. She is so helpful and has made me feel so welcomed in her classroom.

While the predominant focus of the preservice teachers in their peer-to-peer e-mail journals was on their own development as teachers and on their planning for teaching the curriculum, a closer look at the comments coded in these two categories shows the participants in this study were developing a reflective stance about these topics as they thought and wrote about their experiences in the field. Their comments about teacher development showed evidence of metacognitive thinking about how they are developing as teachers. For example, one male teacher candidate wrote to a peer:

My internship is finally starting to pick up. I am starting to feel more comfortable and appreciated. At the beginning of the semester I was feeling out of place and as if I was not wanted or appreciated, Now I feel the students are starting to warm up and realize that I will be there for a while.

And, one female participant wrote to a peer:

Mrs. W's strongest teaching areas just happen to be my weakest areas (social studies and math). I am certain I will learn a great deal from her.

Insert Table 2 about here

Purposes of e-mail exchanges with peers

As can be seen in Table 2, the purpose e-mail exchanges served between peers included 26% that we coded as reflective in nature (*When I am a teacher I want to lunch with my students. It gives the teacher time out to have a one-on-one conversation with his/her students. It's real important to know more about your students than just their grades.*), 22% as descriptive (*The children worked well and I allowed for the same flexibility of noise that I had witnessed at my last visit.*), 19% as supportive (*I enjoyed your journal. I hope to hear from you again.*), and 14% as evaluative (*Nothing but lecture for three solid hours is tiresome.*).

Interestingly, the only gender difference we found had to do with supportive comments including expressions of approval and offers of help. In this category 30% of the male participants' comments were coded as supportive (*Whatever you decide to do, I am sure you will be an asset at the school.*), while only 19% of the female participants' remarks were coded as supportive (*Happy Birthday! I hope you had a nice day .*).

Content of E-mail Exchanges with Keypals

Discussions about issues of teacher development (36%) and personal issues (36%) accounted for almost three-fourths of the content of the exchanges between keypals. There were also interesting gender differences in these exchanges. For example, 44% of the e-mail exchanges from the male participants in this study were about personal issues, while this topic accounted for 35% of the content of the keypal exchanges among the female participants. The category called personal issues included comments about recreation, cousework, jobs outside of school, and families. For example, one of the male teacher candidates described to his keypal these personal issues and requested feedback as well:

The schoolwork is starting to pile up and no matter how late I stay up, there are still a hundred more things to do. How about you?

Another example of personal concerns shared by a female participant in her message to her keypal was very similar in tone:

This semester I am taking 20 semester hours and working two jobs, not to mention planning a wedding.

On the other hand, 39% of the content of the keypal exchanges by the female participants focused on their own development as teachers (*For the*

fall semester of school, I am currently working in a Kindergarten class. This has been an enjoyable learning experience for me.), whereas only 19% of the male participants' exchanges with their keypal were about this topic (*I am now in fifth grade. I love it. Last semester I had Kindergarten. I did not have a very good experience with that grade. It seemed to me that I was baby-sitting too much. I believe that I could have done kindergarten without going to school.*).

Purposes of e-mail exchanges with keypals

The purpose of e-mail exchanges between keypals included descriptions (30%), unsolicited feedback (19%), question asking (16%), and reflective comments (14%). Descriptive exchanges with keypals included statement such as *"I have attended this school for three years now and am scheduled to finish school in the summer"*, whereas unsolicited feedback offered to a keypal included generally supportive comments such as *"I got your message and I'm so glad you shared with me."* On the other hand, questions asked of keypals included ones such as *"What kind of program does your school have?"* Reflective comments found in keypals exchanges included ones like this:

> *I feel that I have benefited greatly by being able to observe and teach twice a week in an elementary classroom for three semesters before actually having to student teach.*

One gender difference in the type of messages exchanged between keypals had to do with the reflective comments, in that 27% of the male participants' remarks to their keypals (*I felt relieved because this is a student that I have had trouble with in the past. Today we seemed to make a connection and he now understands that I am an authority figure who won't put up with his mischievous actions.*) and 18% of the female participants' exchanges were coded as reflective in nature (*I am learning a great deal from my on-site teacher educator.*). There was also a gender difference in question asking with 32% of the female participants' exchanges based on asking questions of their keypals (*I especially love studying the Civil War. I wonder if people in states, such as Indiana, that did not participate in the war, hold as much interest?*), while only 20% of the male participants' exchanges included questions (*What's your concentration* ? [or major]).

Content of E-mail Exchanges with Supervisor/Instructor

The main focus of the e-mail exchanges between the participants in this study and the first author (who was also their university supervisor, academic advisor, and instructor for their weekly seminar attached to their field experience) revolved around the topic of their development as teachers (33%) and issues around teaching (21%) including planning lessons and teaching the curriculum. These messages were unsolicited and separate from their journal assignments, but they often started a string of e-mail correspondence that lasted for several weeks. However, not all of the teacher candidates in this study corresponded regularly via e-mail with their supervisor/instructor, even though everyone did exchange e-mail regularly with their peers. An example of the types of messages received by the supervisor/instructor about teacher development included this one from one teacher candidate:

It means a lot to me that you have confidence in my capability and are worried about the outcome of my internship.

And, an example of unsolicited comments received via e-mail related to teaching included this one from a teacher candidate:

I was unaware of Mrs. M's rules concerning this morning ritual so I asked several reliable students and the decided to act in accordance with her policy.

Nineteen percent of the content in these exchanges was about technical issues (*I am also having trouble printing our e-mail*), particularly about problems with electronic mail in general or their keypal project in particular. And finally, 16% percent of the conversations were about personal issues including their coursework, schedules, and recreation plans. For example, one participant wrote to say: *"I did enjoy the play and my wife was glad to finally meet you."*

Purposes of e-mail exchanges with supervisor/instructor

One-third of the messages from the participants to their supervisor/instructor were coded as descriptive (*I have not worked out a schedule with Mr. S- and Mrs. W- yet. I intend on having a set schedule for both places so I can plan specific activities and observations.*). However, 13% of the messages received from the teacher candidates in this study were coded as reflective (*I am quite nervous about my internship this next semester but hope that I am not getting in over my head with the TMH class.*), with 12%

coded as unsolicited feedback (*Thanks for taking time out of your busy schedule to give me words of encouragement.*), 12% as offering support (*Anyway, welcome back to you also. I hope you have a good semester.*), and 12% as question asking (*Mrs. D- wanted me to ask you how Lunch Buddies were to work this semester?*).

Limitations of this Study

The analysis of three kinds of e-mail exchanges among preservice teacher candidates in this study has several limitations, including technological and methodological ones. Even though we analyzed the content and use made of all e-mail exchanges between peers across two semesters, we only studied messages sent to keypals and received by the supervisor/instructor. We did not include the supervisor's replies nor the messages received by keypals. Also, these data represent e-mail exchanged among only one group of 24 preservice teachers over two semesters. Furthermore, the scope of this project is not necessarily representative of the range of possible uses of e-mail in teacher education programs. For example, a colleague uses e-mail to give written feedback to her team of preservice teachers following classroom observations, which would also have been interesting to study. In addition, analysis of the keypal portion of these data should be considered preliminary because this project only started during the third semester of the PDS program (the second semester of data collection for this study) and lasted only one semester. Furthermore, there were technical and human problems getting the keypal exchange coordinated. And, although we noted some interesting gender differences in these data, we have to remember that there were only four males and 20 females participating in this study. We also did not analyze the data for ethnic differences or compare messages of the traditional versus non-traditional teacher candidates who participated in our study. We have no reason to think that there are differences in these groups but our numbers are too small to be statistically robust or generalizable. Finally, the unstructured nature of the e-mail exchanges in this study likely influenced the content and purpose of these messages. Other researchers who have studied telecommunications among preservice teachers, such as Souviney, et al. (1995) and Thomas, et al. (1996) suggest that technical issues, the demands of the task, and the existing social network all influence the uses made of electronic mail with preservice teachers. Our expectation was that participants would communicate with

peers and keypals every few weeks but no structure was provided as to the form or content of these exchanges. However, the participants wrote reflective dialogue journals prior to and during this study, so they had some reflective opportunities that may have influenced the nature of their exchanges.

Discussion

In summary over half of the dialogue in the peer-to-peer e-mail was about individual or personal concerns, either relationships or participants' thinking about their development as teachers. However, almost a third of the conversations were about teaching issues including curriculum, instruction, and planning. The presence of these topics echoes early work by Frances Fuller (1969) and Fuller & Brown (1975) about preservice teachers' developmental levels of concern. However, their presence also validates more recent claims by Guillame & Rudney (1993) and Hoover, (1994) that the concerns of preservice teachers may include both personal (survival) and curriculum concerns, that these may be present simultaneously, that they may shift over time, and that are not necessarily sequential or discrete.

In contrast with other studies of e-mail messages exchanged among peers (e.g. Anderson & Lee, 1995; Merseth, 1991; Thomas et al., 1996) the content and use of these peer-to-peer e-mail journals in this study was more than just personal and supportive. The participants in this study reflected on and shared issues about their development as teachers and about teaching the curriculum in thoughtful ways. They also served as sounding boards for their peers who sought to share problems (*I thought I would write to you and tell you about an exceptionally bright student that I have in my internship at W-...*), or celebrate solutions to problems encountered (*I almost forgot, another thing I did that I think went well was the way I complimented the children on their work and behavior.*). In conclusion, given the goal of our activity-oriented, inquiry-based teacher education program to engage prospective teachers in a variety of reflective practices, we feel that peer-to-peer e-mail exchanges are beneficial for helping our teacher candidates' develop and construct their understanding of teaching and learning.

The predominant focus of the keypal exchanges was also on either topics related to their own development as teachers, including concerns and plans as future teachers and developing their teaching skills, or on personal issues related to their lives outside of teaching. Given that over 70% of the

keypal exchanges during this study were about personal issues and teacher development, we have to consider the influence of the context of these messages, their purpose, and the structure of this part of the participants' journal requirements. For example, we suggested that the participants begin their keypal exchanges by introducing themselves to each other and then learn about their teacher education programs. Perhaps this accounts for the fact that there was little discussion of professional issues or relationships between keypals. In addition, the keypal exchanges were sporadic, problematic, and frustrating for a number of participants due to technical problems. This may account for the fact that the content of the messages remained on a personal level and rarely moved into conversations about teaching (11%) or other professional concerns. In fact, 10% of the keypal conversations included references to technical problems with their keypal exchanges. Also, the fact that personal topics dominated keypal conversations should not be surprising given the friendly nature of this penpal-type exchange and the short time most participants had to correspond with other prospective teachers. Nevertheless, the keypal exchanges during this study appeared to be a good forum for our teacher candidates to reflect on issues related to teacher development with other prospective teachers. For example, a male participant shared his thoughts about his own development with his keypal in this manner:

Before entering the school of education I had no idea of what I was going to do. I had always thought that teaching would be fun but I didn't think it was a career for me. A few years back I took my first education class and I have been hooked ever since.

When they did converse with their keypals about teaching issues, the exchanges were supportive, descriptive, and sometimes reflective as these comments show:

I liked the idea you had about fish, especially using microscopes. I am getting to know them and feel very comfortable teaching them. I did a lesson for fire prevention week called Fire Bug. We talked about the dangers of fires and what you would do if your clothes ever caught on fire.

The main focus in the content of the preservice teachers' comments in their e-mail to their university supervisor/instructor was also about teacher development, followed by topics about teaching, including planning, curriculum, and instruction. Not surprisingly, there are also a fair number of

comments about the logistics of e-mail, especially at the start of this project and when the keypal project was introduced during the second semester. Many, though not all, of the participants used their e-mail to contact and converse with their supervisor/instructor about personal issues, indicating that the availability of e-mail was useful for some. Those who had modems and home computers or those who used the campus computer labs regularly were most likely to send e-mail to their supervisor/instructor, even though this was not required. Other preservice teachers on the team tended to want to talk in person during visits to the schools, before or after class, or during office hours, rather than use the telephone. Nevertheless, several participants seemed to find the e-mail discussions more private, convenient, and sometimes timely for discussing concerns about teaching or for longer conversations about their development as teachers.

Thomas, et al. (1996) concluded in their study that telecommunications may be depersonalizing as a learning tool, but perhaps this is not the case for all users. It may be that e-mail provides some with a convenient, relatively easy way to communicate and to reflect in writing with colleagues, whereas for others face-to-face or voice communication is preferable. Furthermore, the participants in this study knew each other well as a result of the cohort model our PDS program, which may have contributed to their comfort level in exchanging messages electronically. This, of course, warrants further research.

Anecdotal evidence, found in annotations to entries in the Technology Portfolios prepared by the participants in this study as another requirement of their teacher preparation program, sheds some light on this variability and reflects individual differences participants report in the value of e-mail for them:

Using e-mail has been a new experience for me, The first few times that I tried to use it, I became very frustrated. Now I think I have the hang of it. I think this will be a great asset to me as a teacher, I can send messages to people that I may or may not know around the world. I can ask someone in another country for ideas on how to do a particular lesson, This allows endless sources of information. This technology will also help me when I am teaching my students to write a letter. I intend to have my older students write using e-mail also. With this new technology it will be possible to communicate with people around the world. (Mary)

My e-mail account is used primarily for communication... I have demonstrated both the sending of and responding to messages on the account, as well as, forwarding messages. It is used for casual conversations, the transfer of journal entries written about classroom observations in my internship, and to share information with my team leader in my internship program. I also use the account to communicate with my professors and to receive information off the Internet. I have, on several occasions, used the system to share professional ideas with other teachers across the country. I think children should also be able to demonstrate similar uses of an e-mail account ... (Sam)

I have had a great experience using the e-mail. It really has helped me not only academically but socially also. Since obtaining the e-mail account I was able to get many ideas for the use of technology in the classroom. I have explored with Gopher and successfully obtained an address for a friend at a University in Florida... This was just a wonderful experience for me to be able to communicate... I have also enjoyed being able to send my reflections to my colleagues without having to print it out and hand deliver it... This may sound trivial but to a person who finds computers challenging it is a revelation! The experience has really been rewarding and I will continue to build upon the knowledge I have already accumulated. (Tammy)

Implications for Teacher Education

Electronic mail and other methods of telecommunication have the potential to impact the way we do business in teacher education now and in the future. More and more college and university campuses are providing their teacher education candidates with e-mail accounts and access to the Internet and the World Wide Web. Telecommunications makes accessing, sending, and sharing information almost instantaneous. How we as teacher educators can make the best use of new technologies is important to continue to study. We are especially interested in continuing to study the potential benefits of e-mail exchanges with keypals who are teacher candidates in different states and we are also looking forward to hooking up preservice teacher candidates with elementary age children via e-mail. The content and benefits of the communication that takes place in these kinds of electronic exchanges and those available through the various LISTSERVS and bulletin boards that teachers may join on the Internet is also of interest to us. However, we must be cautious about our purposes for using

telecommunications in teacher education. As at least one scholar has noted in doing research about learning with technology (e.g. Clark, 1983, 1985, 1994), the medium is not the message. The technology is only a delivery system. It is the content and the learning that we must evaluate, not the technology itself.

The goals of our teacher education program at UNCG include educating skillful and thoughtful teachers. Reflection can be encouraged in many ways. If we can foster reflection by structuring peer-to-peer communications via electronic mail that encourages prospective teachers to be thoughtful about the process of learning to teach, then we should do so. This study provides encouragement that this is possible using telecommunications as a tool to help educate prospective teachers.

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Table 1
Percent of each topic discussed in three kinds of e-mail exchanges:
Peer-to-Peer, with Keypals, and between Student and Supervisor/Instructor

	Peer to Peer	Peer to Peer	Peer to Peer	Keypals	Keypals	Keypals	Student to Supe	Student to Supe	Student to Supe
	Male	Female	Total	Male	Female	Total	Male	Female	Total
TOPICS	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Relation - ships	14%	8%	9%	0%	3%	2%	7%	5%	6%
Teacher Develop -ment	34%	39%	38%	19%	39%	36%	20%	44%	33%
Personal Issues	0%	3%	3%	44%	35%	36%	29%	15%	16%
Profess- ional Issues	12%	12%	12%	6%	0%	1%	20%	6%	4%
Teach- ing	32%	32%	32%	16%	10%	11%	14%	7%	21%
E-mail	3%	4%	3%	13%	10%	11%	20%	22%	19%
Grade Level	3%	3%	3%	3%	3%	3%	2%	1%	1%

Table 2
Percent for each type of e-mail exchanged:
Peer-to-Peer, with Keypals, and between Student and Supervisor/Instructor

	Peer to Peer	Peer to Peer	Peer to Peer	Keypals	Keypals	Keypals	Student to Supe	Student to Supe	Student to Supe
	Male	Female	Total	Male	Female	Total	Male	Female	Total
USES	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Describing	21%	23%	22%	33%	29%	30%	30%	34%	33%
Reflecting	22%	27%	26%	27%	18%	19%	14%	13%	13%
Feedback not Solicited	4%	5%	5%	0%	2%	2%	19%	18%	12%
Request for Feedback	5%	5%	5%	13%	21%	20%	9%	11%	10%
Support	30%	19%	19%	7%	12%	1%	7%	14%	12%
Evaluating	20%	13%	14%	0%	3%	3%	2%	9%	7%
Problem Solving	4%	1%	2%	0%	0%	0%	2%	0%	1%
Question Asking	8%	7%	7%	20%	32%	15%	16%	10%	12%

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